amount of material which would be accelerated at the rate of one foot per second per second by the gravity pull of the earth on a one-pound body at 45° north latitude and at the level of the sea.

The word weight according to scientific usage means the force with which the earth pulls on a body, and it can be expressed most intelligibly in dynes or poundals.

Many teachers of engineering conform to the popular usage in that they employ the word weight to designate the absolutely definite and invariant result which is obtained by weighing a body on a balance scale, and to get what they call the "mass" of the body they divide this so-called weight by the acceleration of gravity which is a variable! They do not remember, as Professor Hoskins does, that they should use the value of the acceleration of gravity at a certain place which has been agreed upon, and this is equivalent to saying that they do not understand what they are doing when they divide by "*g*." We wish indeed that the thing were as simple as Professor Hoskins thinks[6] it is, namely, a mere matter of dividing by 32.1740; and of course it is just that simple —to the man who understands it.

W. S. Franklin,
Barry MacNutt

PRE-WISCONSIN GLACIAL DRIFT IN THE BOSTON BASIN

To the Editor of Science: During the past few weeks exposures have been made in connection with extensive excavation work in the city of Boston where one, and possibly two, pre-Wisconsin drift sheets have been uncovered.

The evidence consists of a zone of extremely weathered material beneath the Wisconsin drift, an erosion unconformity, different types of deposits, a slight trace of an interglacial soil, some interglacial subsoils, and an apparent difference in direction of the source of included debris. It was possible to determine with some accuracy the zone of post-Wisconsin oxidation, and the final shaping of the ridge in which this evidence was found appears to be due to the re-advance of an ice sheet which slightly contorted the uppermost waterlain materials. The axis of this ridge is accordant with the direction of the striæ of the last glacial advance in the region.

A paper is now in preparation covering in more detail this important clue to older Pleistocene deposits in eastern Massachusetts.

R. Preston Wentworth
Harvard University

[6] See footnote on page 685, Science, May 7, 1915.

A SERIOUS NEW WHEAT RUST IN THIS COUNTRY

On May 21 of this year, a party representing the office of cereal investigations of the U. S. Bureau of Plant Industry discovered the yellow leaf rust (*Puccinia glumarum* Eriks. and Henn.) of wheat on several varieties of wheat in a field in the vicinity of the Indian school at Sacaton, Ariz. The presence of the rust was first called to the attention of the party by Dr. F. Kølpin Ravn, of Copenhagen, Denmark, temporarily employed by the U. S. Department of Agriculture in consultation with officials of the department on cereal diseases. At about the same time, A. G. Johnson found the rust also on *Hordeum murinum* in southern California. The rust was not afterwards found on wheat anywhere in California, but later, during June, was found in considerable abundance at various places in Oregon and Washington, and to some extent in Idaho, and a very few specimens at Bozeman, Mont., and Logan, Utah. Up to July 1 it has not been seen anywhere east of the Rocky Mountains. In Oregon and Washington the rust was also found on barley, and at Pullman, Wash., it was found by the writer on a species of wild grass as yet unidentified.

In various minor ways Dr. Ravn has been of great help to the cereal pathologists, but the discovery of the presence of this rust is a particularly interesting example of the benefit resulting from a cooperation of foreign botanists occasionally in the investigation of problems in this country with which such men are already acquainted in their own country. This rust being common in Europe and usually the

most serious one, it was readily detected by Dr. Ravn, and after calling it to the attention of others it was not at all difficult to recognize it again.

It has always been a matter of surprise to the writer that this rust has not occurred in North America before, the rust being so common in Europe and samples of wheat constantly passing back and forth. Nevertheless, its existence this season in such abundance in portions of Oregon and Washington makes it evident that either the rust has increased with remarkable rapidity or has already existed in the country for several years. The latter, if true, would be in face of the fact that it is easily distinguished from other rusts and that pathologists have been actively studying the rusts of the country. Further details of the occurrence of the rust will be reported later.

M. A. CARLETON

July 3, 1915

SCIENTIFIC BOOKS

A Study of the Orbits of Eclipsing Binaries. By HARLOW SHAPLEY. Contributions from the Princeton University Observatory, No. 3, 1915. 4to. Pp. vii + 176.

In astronomical literature one of the most frequent subjects refers to the "orbit" of a heavenly body. In fact, for a long time a standard topic for a doctor's thesis was the determination of the definitive orbit of a comet. Here the task of the candidate was to derive from observations, made in all parts of the world, the best possible numerical values for the six elements or constants which define the path of the comet as a conic section in space with the sun at the focus. Other classes of orbits are those of visual double stars, spectroscopic binaries, and finally, as in the work under review, we have what may be called photometric orbits, since the results are based upon observations of the light variations of stars.

Even to those familiar with the subject, the amount of mathematical analysis that has been based upon the changes of some of the variable stars is a source of wonder. As an illustration may be mentioned the famous star *Algol,* which has been the subject of half a dozen extended monographs, scores of papers and literally tens of thousands of observations. The special importance of the stars whose variations are due to the eclipses of large close companions is due to the fact that these systems give us the only satisfactory clue to the actual diameters of stellar bodies. The theory of such cases has been well understood for a long time, but recently Professor H. N. Russell, of Princeton University, has developed a new method for determining the elements of eclipsing binaries. He recognizes the fact that measures of the light of stars are seldom if ever accurate to one per cent., so that approximate and graphical methods are sufficient for any case that can arise. In essence his method consists of solving not directly for the elements of a double system, but for the best light-curve that will represent the observations, and then the characteristics of the system are easily computed from the curve. A series of papers on this general subject have appeared by Russell and Shapley, and the present contribution summarizes much of the previous work. Though not so stated, it is understood that this is a thesis for the doctor's degree, with subsequent additions to bring the work into complete form.

Whereas formerly an exhaustive study of one star was thought to be quite a piece of work, Dr. Shapley with the new methods has undertaken and carried through a pretty thorough discussion of 90 eclipsing stars, or all for which any sufficient data exist at the present time. We learn that the discussion of a single object required not less than a day, nor more than two weeks. Even though nearly all of the observational material was already available, it was a considerable task of mere routine to get it together, and one of the advantages of this memoir is that it will serve as an index to the best sources of information concerning any particular star.

There is a vast difference in the quality and completeness of the data for different systems, and many of the numerical results are avowedly only rough, or perhaps even guesses. In particular, the proportion of light which comes from the fainter component, as indicated by the secondary eclipse, has to be assumed in